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NEW DIRECTIONS FOR MILITARY DECISION MAKING RESEARCH IN COMBAT AND OPERATIONAL SETTINGS

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New Directions for Military Decision Making Research

In Combat and Operational Settings

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New Directions for Military Decision Making Research In Combat and Operational Settings

How unique is the decision process in military settings compared to decision making in other situations? Of the knowledge gained from decision making research in other organizations, what can be transferred to military organizations, and what knowledge is specific to the military context? Can military decisions and decision making be improved, and if so, what recommendations, given the current state of research, can be made?

These questions are difficult to answer for a number of reasons. The literature on decision making is extensive. It spans well over a fifty-year time period and draws on voluminous research in economics, operations research, psychology, sociology, social psychology, political science, computer science, and management. Examining this massive accumulation of information is a daunting task, not to mention what would be required to integrate the results into coherent statements. Disciplined-based research efforts have produced results that are difficult to reconcile given competing assumptions, paradigms, methods and interpretations. Although the ultimate goal of most decision making research has been to improve decision making practice, transfer of the "lessons learned" has been limited by discipline boundaries, research methods, and lack of generalizability to all settings and situations. Appropriately, advice to the practitioner has been constrained.

Yet the questions of how to improve decision making practice persist. They are especially pertinent to military organizations

whose decisions can affect the lives of thousands of people. Despite the difficulties involved, officers still want and need to know how to improve their decision making processes and make better decisions.

With these needs in mind, a review of the decision making literature was undertaken to determine the general state of the field. Although a complete analysis of fifty years of research spawned from multiple disciplines was not possible given a limited amount of time, an overview of the major streams of decision making research was. The objective of this initial effort was to establish a base of general knowledge: Where had decision making research been? Where was it going? And most importantly, what relevance does it have to military decision making? Depending on the answers to these questions, recommendations then could be made on how to inform military decision making research in the future.

The structure of this paper, therefore, follows from these basic questions. The first section summarizes the major streams of decision making research regardless of the discipline base. Future trends in decision making research are anticipated in section two, especially in terms of their relevance for operations and combat. And finally, recommendations for future military decision making research are summarized in section three.

The Roots of Decision Making Research

There are three general streams of decision making research. The first stream, titled the **Rational Decision Making Approach**, is both generic and prescriptive. It is generic because decision making research in this mode is a search for general explanations of making decisions. The decision making theories that evolve are expected to be applicable to all organizations. Unique organizational processes and special individual attributes are not felt to be adequate to explain decision making behavior.

Since decision making theory is considered to be generic, researchers from this perspective can then prescribe the one best way of making decisions. The earliest of these prescriptions was based on economic rationality or the optimization of individual choice. This normative or prescriptive approach usually was advocated by economists to explain individual decision making, while the organizational analog was developed by management scientists, engineers, statisticians, and operations researchers (Tallman & Gray, 1990).

The rational decision making approach has several built in assumptions, some explicit, some implicit (March, 1981:205-244).[1] First, it is assumed decisions are uniquely determined by environmental constraints. Knowledge of individual and group decision processes within an organization is not expected to affect decision outcomes. Information about the constraints, such as competitive pressures, social class, and demography are alone adequate to predict action.

Secondly, decision making is willful. It results from intentional actions in the pursuit of individual or collective

purpose. It also presumes a knowledge of a set of alternatives for action, which are defined by the situation and known unambiguously; it presumes a knowledge of consequences of alternative actions, at least to a probability distribution; it presumes a consistent preference ordering that specifies an objective function by which alternative results of action can be associated with their subjective value; and it presumes a decision rule by which decision makers select an alternative on the basis on its consequences for the highest expected value.

Thirdly, the rational model of decision making presumes that the primary results of a decision process are decisions, and the results of these decisions are important to individuals, groups and organizations. In fact, the centrality of a decision for the observer assures centrality of the decision for the participants of the decision process. Furthermore, decisions can be understood by an analysis of the rational decision steps outlined above.

The second stream of decision making research, commonly espoused by psychologists, political scientists, and sociologists, challenges the assumptions of rational decision making. Characterized as **Descriptive or Behavioral Decision Making**, its objective is to call into question rational decision theory by pointing out its poor fit with actual individual and organizational behavior. However, the logic of this approach is not to abandon rational action. The point is to improve choice through a better understanding about how decisions actually are made. By improving assumptions about preferences, knowledge, and decision

rules, the expectation is that the decision maker could make better decisions, even if they were not optimal ones.

Behavioral or descriptive decision making begins by challenging the assumption of process irrelevance. It is argued that environmental constraints do not completely determine organizational action. Microbehavioral phenomena of choice are also important in determining behavior. Furthermore, the environmental constraints do not impose unique solutions on the organization. "Sloppy organizations adopt to somewhat sloppy environments in ways that make general sense, without reaching a unique solution" (March, 1981:209). Organizations act on the basis of incomplete information; their search rules emphasize feasibility more than optimality; decisions depend on the order in which alternatives are presented; decisions depend on the changing aspiration levels of the organization; and decisions depend on the way organizational slack operates to dampen major swings in environmental stringency. In addition, organizations can affect their environments, even create them. Environmental constraints are in part dependent on past organizational decision processes.

Secondly, decision processes are found to follow other kinds of logics besides the logic of intentionality and rationality. Four logics are identified in the literature: **the logic of bounded rationality; the logic of conflict and strategic action; the logic of rules and obligatory action; and the logic of ambiguity.**

The **logic of bounded rationality** is a theory of limited rationality. Rationality is constrained because there are limits on the number of alternatives known and considered, and there

are limits on the amount and accuracy of the information utilized in the decision process. This formulation of decision making is often characterized as problem solving. A failure to achieve a goal (problem) stimulates a search for a solution that continues until an alternative that is good enough to satisfy the existing goal (problem) is found. The search process concentrates in area of old alternatives, and through trial and error, selects a solution that makes marginal improvements to the present situation. Whether described as "muddling through" by Lindblom (1959;1979), as incrementalism by Mintzberg et. al. (1976), as feedback-react" procedures by Cyert and March (1963), or as cybernetic processes Steinbruner (1974), the concern is how attention, a scarce organizational resource, is allocated in the search process for solutions.

The **logic of conflict and strategic action** challenges rational decision making in describing organizations as conflict systems (March and Simon, 1958; Cyert and March, 1963, Pfeffer, 1981). Rather than having simple, consistent preference functions, organizational participants have different preferences, and different levels of resources to advance and defend those preferences. It is further assumed that each participant will use those resources to pursue his or her personal gain. To enhance one's of "winning," individuals mobilize and form coalitions which are maintained with exchange agreements, side payments and logrolling. Sequential attention to goals substitutes for collective agreement in order to keep the coalition together. Disputes between organizational coalitions are resolved by

"force." That is to say, those with the greater amount of power emerge as "winners," those with less, the "losers." Thus organizational decisions can be characterized as "weighted averages of individual desires, where the weights reflect the power distribution among individuals" (March, 1981:p. 216). Ultimately, power drives the decision logic of organizations, especially when resource scarcity is factored into the decision context, and limited resources must be allocated to multiple organizational coalitions.

The logic of **rules and obligatory action** takes issue with the logic of intentionality by arguing that most of the behavior in organizations is specified through standard operating procedures. These procedures are not necessarily written, but they are "standardized, known, and understood with sufficient clarity to allow discourse about them and action based on them" (March, 1981:222). Instead of searching for the optimal alternative, the search process in this case involves a probe into nature of the situation followed by a choice of behavior that fits the situation. The task becomes one of assessing the situation or position and then "deciding" how to behave appropriately. Rules guide this decision process so understanding how rules are learned, applied, broken, and change are central to this logic. "The intelligence of the process arises from the way rules store information gained through learning, selection, and contagion, and from the reliability with which rules are followed" (March, 1981:226).

The **logic of ambiguity** in contrast to the logic of rationality does not assume that people and organizations have prefer-

ences, nor does it assume that preferences are knowable and known, consistent, precise, or stable, Preferences are considered to be ambiguous; instead of driving action they are deduced from action. They are often expressed but not followed. They are inconsistent, imprecise and they change (Cohen, March and Olsen, 1972; Cohen and March, 1974; March and Olsen, 1976). Furthermore, this ambiguity over preferences is considered to be a form of organizational intelligence. It is argued that "ambiguity allows preferences to develop through action, that ambiguity reflects an intelligent modesty about the adequacy of guesses about future wants, that ambiguity is part of a sensible effort to manage the tendency for preferences to become inappropriate, and that ambiguity is a way of building protection from the political use of rational argument" (March, 1981:228).

Behavioral and descriptive decision theory also differs from the rational theory of decision making in a third important way in its assumption about outcome primacy or results. Behavioral theory does not assume that the major results of a decision process is a decision, nor that decisions are understood by an analysis of the process. Furthermore, the centrality of a decision for the observer does not ensure its centrality for a participant.

Instead, behavioral theory believes that the decision process captures only part of people's attention since it is embedded in a complex pattern of competing activities. To understand decisions one must understand how decisions fit into the fabric of peoples' lives, most particularly how people allocate scarce

attention among competing demands. Thus, the focus of this approach is on the analysis of decision attributes and the alternative claims of attention on the possible set of decision actors.

Behavioral theory also acknowledges that one of the most important elements of a decision is its symbolic significance. By demonstrating that decisions accomplish appropriate objectives, and are conducted in important ways, decisions confer legitimacy on decision makers and their organizations. They become important symbols and rituals. Thus, "decision making is in part a performance designed to reassure decision makers and others that things are being done appropriately" (March, 1981:232). Even more importantly, intelligent choice is elevated to a core tenet of modern ideology. Decision activities "are part of a set of rituals by which society assures itself that human existence is built around choice, and that human institutions are manifestations of intelligent control of human destiny through rational action" (March, 1981:232).

The third stream of decision making research can be characterized as a **Contingency Approach to Decision Making.** Challenging the rational model's one best way to make decisions, and building on the research from the behavioral and descriptive streams, proponents take the position that decision making varies and **should vary** by the situation or condition that embeds the decision. The objective is to understand the nature of the situation and to apply the decision process that seems most likely to fit under the circumstances.

Various contingency models have been developed (e.g. Thompson and Tuden, 1959; Thompson, 1967; Daft, 1989; Gandori, 1984;

Hrebiniak and Joyce, 1985). The following contingency model, adapted from the earlier work of Thompson (1967) and further developed by Daft (1989), serves as an example.

Two characteristics of organizations are believed to influence the decision situation: goal consensus or the degree of agreement among managers about which organizational goals to pursue; and technical knowledge, the degree of understanding and agreement about how to reach organizational goals. Exhibit 1 illustrates their relationship and the decision processes that result.

Insert Exhibit 1 About Here

In Cell 1, goals are agreed upon and cause-effect relationships are well understood. As a consequence, there is low uncertainty in the decision process and the rational approach to decision making can be used.

In Cell 2, there is low goal consensus and a high level of consensus about technical knowledge. This combination, according to Daft, produces high uncertainty in identifying problems, but low uncertainty in the identification of problem solutions. Under these conditions, managers tend to use the political or conflict model of decision making. Goals are determined through bargaining, debate, and coalition building. But once consensus on goals is achieved, the organization and its decision makers have will have the technology to implement them with a high level of certainty.

In Cell 3, decision makers face a high level of consensus on

goals, but alternative technical solutions are highly uncertain and techniques to make decisions are ill defined and poorly understood. Under these situations, the manager tends to rely on past judgment and experience to make a decision while the organization tends to rely on trial and error. Decisions are made incrementally as problems arise, a solution is identified, and through a sequential step-by-step process, the organization learns what solutions work and which do not. Eventually, over a period of time, the organization and its managers acquire sufficient experience to solve problems, eventually encoding their solutions into rules, standard operating procedures, and heuristics to guide action.

Cell 4 decision making is characterized by low consensus on goals and low consensus on technical knowledge. This condition produces a high degree of uncertainty for managers and organizations. Under high uncertainty, individual managers resort to building coalitions to establish goals and set priorities, while using judgment and/or trial and error to address and solve problems. They also resort to <u>inspiration</u> -- innovative and creative solutions not developed through rational means, and imitation -- adoption of decisions tried elsewhere in the hope that they will work in the new situation. When the "logic of ambiguity" pervades the entire organization, the "garbage can model of decision making" eventually evolves: decisions are made randomly as choice opportunities converge with decision makers, solutions, and problems in no particular order or sequence. Eventually, through trial and error, the organization makes decisions and

solves some problems, but without any degree of predictability or rationality.

The contingency approach to decision making research has led researchers on a quest for the situational and contextual variables that are expected to influence the choice of decision making strategies. For example, Fredrickson and Mitchell (1984) argue that organizational decisions are contingent upon the environment in which the decision is made, while Payne, Bettman, and Johnson, (1988) maintain that decisions are contingent upon the task and the context.

Researchers are expected to continue to probe these and other contingencies in the future.

Implications of Trends for Military Decision Making Research

Decision making research in the future will continue to move toward more refined contingency models of individual and organizational choice. We can expect these contingency models to build on the framework outlined above, as well as those that elaborate on other environmental and task contingencies.

Parallel to this general movement, we also can anticipate military decision making research to begin to develop its own contingency model of individual and organizational choice. Key to this development will be the identification of unique military contexts and the particular contingencies for those contexts.

For example, there are two general military contexts: the warfare or operational context and the peacetime context. Decision making in peacetime military organizations is expected to be similar to decision making in other organizational settings, especially public sector organizations (Rainey, 1989; 1991; Wilson, 1989). Public sector decision making research has been underway for a number of years and has produced various models and theories some of which have been briefly sketched in section one above. (See also Allison, 1971; Bozeman, 1987; Nigro, 1984).

On the other hand, warfare and high threat conditions present unique situations and contingencies for the military decision maker. Under warfare or threats of war, conditions are dynamic such that the situation can change and goals can shift from moment to moment. There are physical threats to well being at the same time individuals are expected to assume personal

responsibility for decision outcomes. Crisis conditions also force time compression on decision makers who are called on to make life or death choices in a matter of minutes or seconds (Klein, 1989). Decision makers on the Vincennes, for example, had approximately three minutes to assess the status of an incoming aircraft before they were required to take action. Combat decisions also require the participation of many people with competing values and viewpoints. They involve the processing of enormous amounts of information, much of which is ambiguous, difficult to interpret, (especially under conditions of stress), demanding heavy time commitment, resources, and coordination from those involved. And as we are well aware, the consequences of decisions in such situations can be far reaching; the price of "military misfortunes" and military decision making is great (Cohen and Gooch, 1990). Thus, operational contexts have properties such as uncertainty, complexity, time compression, and chance to factor into the decision calculus. "No other human activity," according to Carl von Clausewitz, "is so continuously or universally bound up with chance" (1976:85).

Unfortunately, research on military decision making under operational or warfare conditions has been relatively recent.[2] Consequently, some of the contingencies and their impact on decision making are not known nor well understood. For example, time pressure or time compression is thought to be an important contingency for military decision making under operational conditions, but time has rarely been treated in a systematic way by decision researchers (Tallman & Gray, 1990). The little research that has been conducted in other organizational contexts reveals

in general that time pressures force decision makers to simplify their decision tasks and to make more cautious decisions (Abelson & Leve 1985:282; Wright, 1974). Evidence also suggests that under time pressure, there is a tendency to overweigh negative information (Wright, 1974). Janis and Mann (1977:59-64) also found that under severe time pressures or other high stress conditions decision makers become "hypervigilent," or transfixed and do not use the limited time available for optimal processing of alternatives. These findings have led some researchers (Hammond et.al, 1984: Howell, 1984) to posit that time pressure would lead to decision strategies that were more intuitive and holistic in nature.

The level of affect or emotion may be another important contingency that impacts military decision making in operational contexts. While emotions in individuals and groups have been shown to affect decision making processes and outcomes, and differences in negative and positive feeling states and arousal levels have been shown to produce different levels of comprehensiveness in decision making (Elsbach, 1991), there has very little effort to incorporate this contingency in military decision making research.

Another contingency in operational military decision making may be the level of expertise of the decision maker. Experts and novices have been shown to use different decision strategies (Shanteau, 1988). Relative novices tended to rely on analytical decision strategies while more expert decision makers rely on what Klein refers to as "recognition-primed" decision making

strategies (Klein, 1989). Recognition-primed decisions are nonoptimizing and noncompensatory approaches to decision making that involve conscious deliberation to image the action that one wants to accomplish rather than evaluating alternative options that might be available. Given the level of training and education of military personnel, level of expertise is expected to be an important contingency in military decision making.

The search for these and other contingencies will be important steps in military decision making research for the future. Once the major contingencies have been identified, it will be incumbent on researchers to integrate them into a theory of operational military decision making to guide military practice.

Recommendations for the Future

The first recommendation for military decision making research is to be clear about the domain of study. Is the domain of interest really decision making or some other closely related area such as problem solving (MacCrimmon & Taylor, 1976; Smith, 1988; Tallman & Gray, 1990)? The question is an important one for it points out different approaches that can drive the research process. Decision making tends to put emphasis on selection from a provided set of alternatives, while problem solving puts the emphasis on the construction of new alternatives. (Stevenson, et.al.:285). Which is of interest?

That would depend, of course, on what one wants to know. In the case of the Iranian commercial airliner that was shot down by the U.S. Vincennes, killing all aboard, do we want to know how and why Captain Will Rogers made that decision among the alternatives available to him? Or do we want to know why and how the Iranian airliner came to be identified as plane launching an attach on the Vincennes, and what alternatives were generated and considered to solve that problem? How we answer these questions can set us on very different lines of research, courses of action, and ultimately provide answers to very different questions of interest.

From a decision making paradigm, the focus would be on individual or group choice, trying to understand people's motivation, stress, communication and coordination and so forth which prompted their selection of one particular alternative among a pre-established set of alternatives. From a problem solving perspective, the focus would be on how the problem got framed the

way it did, what factors -- human, technological, organizational, or environmental contributed to this framing, and what alternatives were generated and selected to deal with it. While both perspectives may be of interest, the problem solving approach is expected to be the more fruitful one if the objective is to understand how to prevent errors of this type in the future.

A second recommendation pertains to the multidisciplinary character of organizational decision making. Every effort must be made to incorporate the various disciplinary perspectives into future military decision making research. For too long, psychologists, sociologists, economists, operations researchers, political scientists, and others have conducted their decision research unaware of work in other areas. Yet the field of decision making is inherently interdisciplinary: it involves the study of an individual's emotional and cognitive processes, group dynamics and interaction, organizational structure and systems, and larger contextual, environmental, and market forces. While ideally each researcher should be informed of the research pertaining to all these disciplines, given the complexity and breadth of the decision making literature, such an expectation is not realistic. One can recommend, however, the formation of decision making research teams with members representing very different paradigms and disciplinary approaches. Their collective efforts in designing research, conducting the studies, and interpreting results could go a long way in providing a more integrated understanding of military decision making.

A third recommendation for future military decision making

research concerns research strategies. According to Mohr (1982), research can be classified in terms of two types -- variance or process. Most investigations of decision making research have employed the variance strategy. The variance approach views the decision as the final outcome or the dependent variable. The goal is then to explain its variance in terms of an array of independent variables. With the variance approach, the independent variables become the necessary and sufficient conditions to explain the variance of the dependent variable. Time is not of concern for the ordering of the variables, other than to assume that the dependent variable is a "final cause" of the independent variables.

The process strategy, on the other hand, investigates a phenomenon in terms of a succession of events. In this light, decision making is equifinal, with multiple interactions among the antecedent variables. Since there is an infinite number of possible interactions among antecedent variables, the best a researcher can do is to document a set of actions for a particular decision in a particular context. Thus, Mohr recommends a process approach for decision making research and avoidance of the variance approach which, he claims, is responsible for contradictory and inconclusive results in the literature.

Adopting Mohr's recommendation for military decision making research, leads to a fourth recommendation. What is implied in the process approach to decision making research is the application of different research methodologies and study designs. Use of clinical case studies (March and Olsen, 1976), simulations (Cohen, March and Olsen, 1972), and historical and anthropologi-

cal techniques (Pettigrew, 1973) are more appropriate for decision making research than other methods that rely on variance techniques. Methods of decision making research, in other words, should fit the research strategy employed.

As part of this endeavor, one should anticipate more field-based empirical research. If transfer and application of decision making research from other organizational situations to combat settings is suspect, and the position taken in this paper is that it is, then the logical step is to launch a separate stream of research devoted to the study of military decision making in operational settings. The ultimate goal would be to understand the context and its constraints in such a way as to build field-based theories specific to decision making in operational and combat settings. The methodology would also avoid some of the traditional problems associated with laboratory studies such as the use of novices or students instead of experienced decision makers, and the use of scenarios which lack comparability to threat and combat conditions.

In line with more field-based empirical research, new techniques such as cognitive mapping (both individual and collective maps) and relational and network analysis could be employed. For instance, the use of cognitive maps would enable the researcher to investigate whether decision makers shared the same metal models and decision rules during combat when forced into CIC decision choices. Relational analysis would be useful in investigating the dynamics of the decision process, and how decision teams coordinate their actions.

A final recommendation for military decision making research involves the use of performance indicators. Without some measure of performance to assess decisions, researchers are forever caught in what has been described as "Hume's guillotine" (Pennings, 1986:231). Factual descriptive statements follow other factual statements. Consequently, one can never proceed from statement of fact to normative or prescriptive statements about what ought to be. Unless there is some way to judge performance, one cannot "deduce ought from is." Thus, the search for performance indicators to gauge effective decision making should be paramount in the next generation of decision making research. By linking the decision making process to indicators of performance, researchers could demonstrate what processes are preferred over others because they minimize error, cognitive bias, or other destructive consequences.

NOTES

1. For the first two streams of decision making research, this section relies heavily on the outline of the field as presented by Jim March (1981).

2. Recent research on operational decision making has been conducted at the Naval Oceans Systems Center in San Diego, California, and at the Naval Training Systems Center in Orlando, Florida. The sponsored research has been devoted to the problem of tactical decision making under stress (TADMUS) and battle group decision making. Initial research findings can be reviewed in the studies of Alphatech, Athans et. al., Salas and his colleagues at the Orlando Center. The research of Feher, Callan and Feher, Gwynne and Feher, and Rudolph and Feher summarizes the initial results at the San Diego Center.

Exhibit 1

Technology Consensus	Goal Consensus: High	Goal Consensus: Low
High	Cell 1 Rational Approach	Cell 2 Bargaining, Coalition Formation
Low	Cell 3 Judgment, Trial and Error; Incrementalism	Cell 4 Bargaining, Judgment, Inspiration, Imitation, Coalition Building Evolving to Garbage Can Model

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